COMPOSITION FOR CANDY AND PRODUCTION OF CANDY USING THE SAME

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Abstract

PROBLEM TO BE SOLVED: To obtain the subject composition easily detachable from the manufacturing framework, easy to mold, and excellent in low hygroscopicity and shape retention stability, comprising a sugar alcohol composition comprising specific ingredients including maltitol and a branched dextrin reduced product.

SOLUTION: This composition affording candy with moderate tooth brittleness comprises (A) 70-95 pts.wt. of a sugar alcohol composition comprising 1-10wt.% of sorbitol, 43-67wt.% of maltitol, 13-25wt.% of maltotriitol and 10-30wt.% of an oligosaccharide alcohol >=4 in polymerization degree and (B) 5-30 pts.wt. of a branched dextrin reduced product comprising 0.1-2.0wt.% of sorbitol, 0.1-3.0wt.% of a hydrogenated disaccharide alcohol, 0.1-5.0wt.% of a hydrogenated trisaccharide alcohol and 90.0-99.7wt.% of a hydrogenated polyol >=4 in polymerization degree.

English Translation of Pages 2-7 of JP 10028531

[CLAIMS]

[Claim 1] A composition for candies in which its solid form comprises:

(a) a 70 to 95 weight portion sugar alcohol composition containing 1 to 10 weight % sorbitol, 43 to 67 weight maltitol, 13 to 25 weight % maltotriitol ~~and 10 to 30 weight %~~ and 10 to 30 weight % oligosaccharide alcohol having a degree of polymerization of 4 or higher; and

(b) a 5 to 30 weight portion reduced branched dextrin.

[Claim 2] A composition for candies according to Claim 1 in which said reduced branched dextrin contains 0.1 to 2.0 weight % sorbitol, 0.1 to 3.0 weight % hydrogenated disaccharide alcohol, 0.1 to 5.0 weight % hydrogenated trisaccharide alcohol, and 90.0 to 99.7 weight % hydrogenated polyol having a degree of polymerization of 4 or higher.

[Claim 3] A method for manufacturing candies in which the solid form of a composition for candies comprises:

(a) a 70 to 95 weight portion sugar alcohol composition containing 1 to 10 weight % sorbitol, 43 to 67 weight maltitol, 13 to 25 weight % maltotriitol and 10 to 30 weight % and 10 to 30 weight % oligosaccharide alcohol having a degree of polymerization of 4 or higher; and

(b) a 5 to 30 weight portion reduced branched dextrin;

wherein such composition is melted and solidified.

[Claim 4] A method for manufacturing candies according to Claim 3 in which said reduced branched dextrin contains 0.1 to 2.0 weight % sorbitol, 0.1 to 3.0 weight % hydrogenated disaccharide alcohol, 0.1 to 5.0 weight % hydrogenated trisaccharide alcohol, and 90.0 to 99.7 weight % hydrogenated polyol having a degree of polymerization of 4 or higher.

[DETAILED DESCRIPTIONS OF INVENTION]

[0001]
[Field of the Invention]

[0002] The present invention relates to a composition for candies and a method for manufacturing of candies using the same.

[0003]
[Related Art and Issues to be Solved]

[0004] Candies are generally manufactured using sugar and starch syrup as main ingredients wherein essences, coloring matters and acidulants are added as necessary, followed by mixing, forming and solidifying by cooling.

[0005] In recent years, new materials, including sugar alcohols, are introduced as materials for candies corresponding to increases in the number f patients suffering from dental decay, diabetes and besity, and for a purpose of improving candies' physical properties and sensory perceptions as food.

[0006] Especially, maltitol is known to be appropriately used for non-sugar candies and low-calorie candies for the following reasons: it has refined sweetness similar to sugar; it hardly causes dental decay; and it has a fewer calories than sugar.

[0007] For example, (1) Tokko S50-30703 introduces, as a method for improving adhesiveness of maltitol, a method to add 0.001 to 20 % of a hydrophilic organic polymer compound, which is selected from soluble starch, dextrin, various gums, such as guar gum, pectin, dextrin hydrogen-added product and which has a molecular weight of 5000 and higher, to solid maltitol.

[0008] Also, (2) Tokkai H6-253773 discloses a maltitol composition for candies comprising: (a) a 75 to 85 weight portion maltitol with purity of 88 weight % and higher; and (b) a 15 to 25 weight portion branched dextrin reduced product. The above reduced branched dextrin comprises, as described in Claim 3 of the publication, 0.1 to 1 weight % sorbitol, 0.1 to 2 weight % hydrogenated disaccharide alcohol, 0.1 to 2 weight % hydrogenated trisaccharide alcohol, and 95 to 99.7 weight % hydrogenated polyol having a degree of polymerization of 4 or higher.

[0009] However, these candies made of the above compositions still have various issues.

[0010] For example, the above (1) tends to produce white turbidity in candies with time in the case of starch and dextrin as an organic polymer compound to be added; additionally, remaining starchy odor and a lack of crunchiness [literally, "fragility to teeth"] are observed. Moreover, in the case of gums and pectin, [the resulting candies] tend to be colored and have a bitter taste.

[0011] Also, the above (2) intends to provide maltitol candies to which starch and dextrin, causing white turbidity, are not added. The resulting candies have improved properties such as: there is hardly any change in the volume during solidification; deformation of the surface of candies after solidification occurs at a lower rate; the composition can be easily and smoothly removed from a frame; and the resulting candies have improved crunchiness. However, the stability is not satisfactory under severe temperature conditions.

[0012]
[Means for Solving the Issues]

[0013] The inventors of the present invention studied characteristics of mixtures of maltitol and various materials for candies to solve the above issues and accomplished the present invention.

[0014] The present invention intends to provide a composition for candies and a method for manufacturing candies using the same wherein the following properties of the composition during and after manufacturing are improved:

the composition can be easily removed from a manufacturing frame;

it can be easily formed by a stamping method and the like;

formation is easy due to the fact that there is hardly any difference in the volume before and after solidification; and

the resulting candies have excellent qualities such as sufficient crunchiness, low hygroscopicity, stability in shape retention at a high temperature of 40 to 60°C.

[0015] In other words, a means for solving the above issues of the present invention is as follows.

[0016] First, a composition for candies in which its solid form comprises:

(a) a 70 to 95 weight portion sugar alcohol composition containing 1 to 10 weight % sorbitol, 43 to 67 weight maltitol, 13 to 25 weight % maltotriitol and 10 to 30 weight % and 10 to 30 weight % oligosaccharide alcohol having a degree of polymerization of 4 or higher; and

(b) a 5 to 30 weight portion reduced branched dextrin.

[0017] Second, a composition for candies according to the above first description in which the reduced branched dextrin contains 0.1 to 2.0 weight % sorbitol, 0.1 to 3.0 weight % hydrogenated disaccharide alcohol, 0.1 to 5.0 weight % hydrogenated trisaccharide alcohol, and 90.0 to 99.7 weight % hydrogenated polyol having a degree of polymerization of 4 or higher.

[0018] Third, a method for manufacturing candies in which its solid form of a composition for candies comprises:

(a) a 70 to 95 weight portion sugar alcohol composition containing 1 to 10 weight % sorbitol, 43 to 67 weight maltitol, 13 to 25 weight % maltotriitol and 10 to 30 weight % and 10 to 30 weight % oligosaccharide alcohol having a degree of polymerization of 4 or higher; and

(b) a 5 to 30 weight portion reduced branched dextrin;

wherein such composition is melted and solidified.

[0019] At last, a method for manufacturing candies according to the above third description in which the reduced branched dextrin contains 0.1 to 2.0 weight % sorbitol, 0.1 to 3.0 weight % hydrogenated disaccharide alcohol, 0.1 to 5.0 weight % hydrogenated trisaccharide alcohol, and 90.0 to 99.7 weight % hydrogenated polyol having a degree of polymerization of 4 or higher.

[0020] The following describes the detail of the present invention.

[0021] A sugar alcohol composition used in the present invention, regardless of its origin and a production method, can be composed by hydrogen reduction of a commercially available starch-saccharified product under the exposure to Raney nickel catalyst or precious metal catalyst. The solid form of the sugar alcohol composition comprises 1 to 10 weight % sorbitol, 43 to 67 weight % maltitol, 13 to 25 weight % maltotriitol 10 to 30 weight % oligosaccharide alcohol having a degree of polymerization of 4 or higher. Especially, a sugar alcohol composition, in which its solid form comprises 2 to 5 weight % sorbitol, 62 to 67 weight % maltitol, 13 to 20 weight % maltotriitol, 10 to 18 weight % oligosaccharide alcohol having a degree of polymerization of 4 or higher, is more preferable for providing readiness in handling during manufacturing due to its sufficiently low viscosity and for superior taste of the resulting candies.

[0022] Such a sugar alcohol composition, for example, is commercially available, such as reduced starch-saccharified product PO-60 (manufactured by Towa Kasei Kogyo Kabushiki Kaisha) and reduced starch-saccharified product PO-40 (manufactured by Towa Kasei).

[0023] Reduced branched dextrin used in the present invention can be manufactured by reducing

commercially available branched dextrin with pressurized hydrogen. Such branched dextrin can be obtained from about 8 to 16 dextrose equivalent weight (DE) which results from separating or removing most of the glucose or oligosaccharide with a low degree of polymerization by a known method, such as chromatographic separation, precipitation and filtering, after liquidifying starch with enzymes.

[0024] A major sugar composition of the above reduced branched dextrin includes 0.1 to 2.0 weight % sorbitol, 0.1 to 3.0 weight % hydrogenated disaccharide alcohol, 0.1 to 0.5 weight % hydrogenated trisaccharide alcohol, and 90.0 to 99.7 weight % hydrogenated polyol having a degree of polymerization of 4 or higher.

[0025] As a commercially available branched dextrin, branched dextrin is available from Sanmatsu Kogyo Kabushiki Kaisha. It is characterized in that it lacks sweetness, strange odors, such as a starchy odor, or strange taste and that it has relatively slow aging at low viscosity.

[0026] A composition for candies according to the present invention can be prepared by mixing a 70 to 95 weight portion of a sugar alcohol composition, such as the previously mentioned reduced starch-saccharified product PO-60 manufactured by Towa Kasei, and a 5 to 30 weight portion of the previously mentioned reduced branched dextrin manufactured by Sanmatsu Kogyo.

[0027] When the sugar alcohol composition is less than 70% while the reduced branched dextrin exceeds 30%, the viscosity of the melted composition for candies becomes extremely high. As a result, placement of the composition into a frame is impossible or extremely difficult; further, the above composition is not preferable for low sweetness.

[0028] When the sugar alcohol composition exceeds 95% while the reduced branched dextrin is less than 5%, expected effects of the reduced branched dextrin, such as improvement in the hygroscopic property and thermal stability, are not provided.

[0029] The sugar alcohol composition of the composition for candies of the present invention obtained as above varies according to the mixing ratio of the sugar alcohol composition to the reduced branched dextrin comprising 0.1 to 2.0 weight % sorbitol, 0.1 to 3.0 weight % hydrogenated disaccharide alcohol, 0.1 to 5.0 weight % hydrogenated trisaccharide alcohol, and 90.0 to 99.7 weight % hydrogenated polyol having a degree of polymerization of 4 or higher. However, a preferable sugar alcohol composition suitable for manufacturing of candies can be about 3 weight % sorbitol, about 50 weight % hydrogenated disaccharide alcohol, about 17 weight % hydrogenated trisaccharide alcohol, about 30 weight % hydrogenated polyol having a degree of polymerization of 4 or higher. Further, it is more preferable that the hydrogenated polyol having a degree of polymerization of 4 or higher contains about 47 weight % hydrogenated polyol having a degree of polymerization of 4 to 19 and about 53 weight % hydrogenated polyol having a degree of polymerization of 20 and higher.

[0030] Moreover, the composition for candies of the present invention can be used as a material for manufacturing candies with or without various products other than sugars, such as coloring matters, essences, fruits, or other sugars and sugar alcohols.

[0031] The following materials other than sugars can be used for preparing candies using the composition for candies of the present invention:

various acidulants, such as citric acid and malic acid;

various amino acid food additives, such as glycine;

highly sweet sweeteners, such as aspartame, stipiocid [phonetic translation], saccharin, lepuocid A [phonetic translation], and trichloro sucrose;

mints, herbs, menthol and various nature remedies;

various flavors, such as apple, strawberry, banana, melon, orange, grapefruit, pineapple, peach, coffee, and cocoa; and

artificial or natural coloring matters.

[0032] Also, sugars and sugar alcohols, which can be used with the composition for candies of the present invention, include erythritol, xylitol, sorbitol, mannitol, lactitol, isomaltitol, hydrogenated glucose syrup, xyloligosaccharide alcohol, sucrose, lactose, fructose, isomaltose, maltose, maltoorigosaccaride, maltodextrin, fructooriqosaccharide, isomerized sugars, coupling sugars, and galactooligosaccharide. One or more of the above can be used by itself or mixed.

[0033] No special limitation is applied to conditions required for manufacturing of candies using the composition for candies of the present invention. Ordinary conditions for manufacturing of candies, such as boiling down [the composition] at 70% concentration under the existence of citric acid or malic acid and cooling it after reaching 180°C, can be employed. In order to prevent the composition of the present invention from a drastic change in its characteristics caused by hydrolysis of the components of the composition, it is recommended to avoid extremely strong acids and storing at extremely high temperature for a long period of time.

[0034]
[Examples]

[0035] The following describes the present invention for further detail in reference to examples and comparisons. However, the scope of the present invention should not be limited by the following examples.

[0036] Unless specified, "%" hereafter refers to weight %.

[0037]
[Example 1]

[0038] 850g of reduced starch-saccharified product PO-60 (manufactured by Towa Kasei) in the solid form as a sugar alcohol composition and 150g of reduced branched dextrin (manufactured by Sanmatsu Kogyo) in the solid form were placed in a two liter stainless container. Water was added to adjust the concentration to 75% to obtain Composition 1 for candies of the present invention. Sugar compositions of the above reduced starch-saccharified product PO-60, the reduced branched dextrin and the resulting Composition 1 were measured by high-speed liquid chromatography.

[0039] The results are shown in Table 1.

[0040]
[Table 1]

Unit: %

	PO-60	Reduced branched dextrin	Composition 1
DP1	3.0	1.2	2.8
DP2	65.2	2.6	55.8
DP3	20.6	2.8	17.9
DP4-19	10.5	18.8	11.7
≧ DP20	0.7	74.6	11.8

[0041] In Table 1, the symbols indicate as follows: DP1 indicates sorbitol; DP 2 indicates a sugar alcohol in which one molecule of glucose is bonded to sorbitol; D3 indicates a sugar alcohol in which two molecules of glucose are bonded to sorbitol; DP4 - 19 indicates sugar alcohols in which three to eighteen molecules of glucose are bonded to sorbitol; and ≧ DP20 indicates a sugar alcohol in which 19 or more molecules of glucose are bonded to sorbitol. These symbols are repeatedly used in the following tables.

[0042] Then, the stainless container with Composition 1 was heated to 180℃ on a 600W electric stove while slowly stirring the content. Thereafter, the content was cooled to about 120℃ and poured into 2g aluminum frames for formation and solidification. Fifteen minutes after the content was poured into the frames, the solidified products were removed from the frame by turning the frame upside down and twisting the frame. Candies according to the present invention (Example 1) were obtained.

[0043] Candies of Example 1 were readily removed from the frames. The resulting candies contained 1.0% water; and they appeared transparent. The surface of the candies was smooth, and sufficient crunchiness was perceived when bitten.

[0044]
[Example 2]

[0045] Composition 2 for candies was obtained under conditions identical to Example 1 except for using 800g of reduced starch-saccharified product PO-60 (manufactured by Towa Kasei) in the solid form as a sugar alcohol composition and 200g of reduced branched dextrin (manufactured by Sanmatsu Kogyo) in the solid form.

[0046] The sugar composition of Composition 2 was measured by high-speed liquid chromatography; the results are shown in Table 2.

[0047]
[Table 2]

Unit: %

	Composition 2
DP1	3.1
DP2	50.7
DP3	17.0
DP4-19	13.7
≧ DP20	15.5

[0048] Then, using Composition 2, candies were prepared in the same manner as Example 1 (Example 2).

[0049] Candies of Example 2 were readily removed from the frames. The resulting candies contained 1.1% water, and sufficient crunchiness was obtained.

[0050]
[Example 3]

[0051] Composition 3 for candies was obtained under conditions identical to Example 1 except for using 700g of reduced starch-saccharified product PO-60 (manufactured by Towa Kasei) in the solid form as a sugar alcohol composition and 300g of reduced branched dextrin (manufactured by Sanmatsu Kogyo) in the solid form.

[0052] The sugar composition of Composition 3 was measured by high-speed liquid chromatography; the results are shown in Table 3.

[0053]
[Table 3]

Unit: %

	Composition 3
DP1	2.9
DP2	44.7
DP3	15.3
DP4-19	14.3
≧ DP20	22.8

[0054] Then, using Composition 3, candies were prepared in the same manner as Example 1 (Example 3).

[0055] Candies of Example 3 were readily removed from the frames. The resulting candies contained 1.2% water, and sufficient crunchiness was obtained.

[0056]
[Example 4]

[0057] Composition 4 for candies was obtained under conditions identical to Example 1 except for using 800g of reduced starch-saccharified product PO-40 (manufactured by Towa Kasei) in the solid form as a sugar alcohol composition and 200g of reduced branched dextrin (manufactured by Sanmatsu Kogyo) in the solid form.

[0058] Sugar compositions of the above reduced starch-saccharified product PO-40 and the resulting Composition 4 were measured by high-speed liquid chromatography; The results are shown in Table 4.

[0059]
[Table 4]

Unit: %

	PO-40	Composition 4
DP1	2.4	2.2
DP2	52.0	42.7
DP3	19.6	16.2
DP4-19	20.0	19.8
≧ DP20	6.0	19.1

[0060] Then, using Composition 4, candies were prepared in the same manner as Example 1 (Example 4).

[0061] Candies of Example 4 were readily removed from the frames. The resulting candies contained 1.2% water, and sufficient crunchiness was obtained.

[0062]
[Comparison 1]

[0063] Composition for Comparison 1 was prepared by using 1kg of reduced starch-saccharified product PO-60 (manufactured by Towa Kasei) in the solid form used in Example 1.

[0064] Then, using Composition for Comparison 1, candies were prepared in the same manner as Example 1 (Comparison 1).

[0065] The resulting candies contained 0.8% water.

[0066]
[Comparison 2]

[0067] Composition for Comparison 2 was btained under conditions identical to Example 1 except for, instead of a reduced starch-saccharified product and a reduced branched dextrin, using 600g of sugar (manufactured by Fuji Seito Kabushiki Kaisha, granulated) and 400g of a syrup (manufactured by Nihon Shokuhin Kako Kabushiki Kaisha, high-maltose syrup) in the solid form.

[0068] The sugar composition of Composition for Comparison 2 was measured by high-speed liquid chromatography; the results are shown in Table 5.

[0069]
[Table 5]

Unit: %

	Composition for Comparison 2 (sugar & syrup)
DP1	0.8
DP2	79.8
DP3	9.1
DP4-19	7.5
≧ DP20	2.8

[0070] Then, using Composition for Comparison 2, candles were prepared in the same manner as Example 1 except for a temperature of 155℃ (Comparison 2).

[0071] The resulting candles contained 2.0% water.

[0072]
[Comparison 3]

[0073] Composition for Comparison 3 was obtained under conditions identical to Example 1 except for using 790g of maltitol with purity of 95% (manufactured by Towa Kasei) in the solid form and 210g of reduced branched dextrin (manufactured by Sanmatsu Kogyo) in the solid form.

[0074] The sugar composition of Composition for Comparison 3 was measured by high-speed liquid chromatography; the results are shown in Table 6.

[0075]
[Table 6]

Unit: %

	Composition for Comparison 3 (Maltitol)
DP1	2.2
DP2	75.0
DP3	2.9
DP4-19	4.9
≧ DP20	15.0

[0076] Then, using Composition for Comparison 3, candles were prepared in the same manner as Example 1 (Comparison 3).

[0077] The resulting candies contained 0.6% water.

[0078]
[Comparison Test 1] (Test for hygroscopicity)

[0079] Tests for hygroscopicity were performed on candies of Examples 1 through 4 and Comparisons 1 through 3 as follows.

[0080] A thermoregulator / humidistat (manufactured by Etack [phonetic translation], FX 210P) was employed to adjust the relative humidity to 65% and the temperature to 30℃ therein. Each sample candy was placed in a weighing jar; 5 jars were then placed inside the thermoregulator / humidistat. The weight of the samples were measured after 6 hours, 24 hours , 48 hours and 72 hours. Rates of change in weight of water were calculated according to the following equation; then, the average values were calculated.

[0081] Rate of change in weight = (weight of candy after storing / weight of candy before storing) x 100 -100

[0082] The test was discontinued on Comparison 3 since it showed crystallization after 6 hours. Table 7 shows the average values of rates of change in weight obtained for other candy samples. The unit in Table 7 is %.

[0083]
[Table 7]

Samples	Hours of Storing			
	6 hours	24 hours	48 hours	72 hours
Example 1	0.7	1.7	2.6	3.3
Example 2	0.7	1.5	2.2	2.8
Example 3	0.6	1.4	2.0	2.4
Example 4	0.7	1.5	2.1	2.6
Comparison 1	0.9	2.5	4.0	5.3
Comparison 2	1.0	2.7	3.6	5.0
Comparison 3	Crystallization was observed after 6 hours.			

[0084] All Examples had relatively low rates of change in weight, in other words, they showed lower hygroscopicity compared to Comparisons.

[0085]
[Comparison Test 2] (Test for thermal stability)

[0086] Tests for thermal stability were performed on candies of Examples 1 through 4 and Comparisons 1 through 3 as follows.

[0087] Sample candies were wrapped a stick-shaped wrapper having layers of polyester (outer layer) / aluminum / polyethylene (inner layer) for complete sealing right after the manufacturing process. [Translator's note: it is not clear from the original whether more than two candies were wrapped in a single wrapper; however, based on the descriptions of the candies' conditions in the following [0088], it is believed that there were a plurality of candies in a single wrapper.] Five [wrapped] samples were stored at 40℃, 50℃, and 60℃ to observe the thermal stability of each sample with time.

[0088] A panel group of 5 observers was formed; the observers were directed to use the following indications: "-" for no change; "±" for candies lightly sticking to each other but being able to be easily separated with hands; "+" for candies strongly sticking to each other and difficult to be separated; "++" melted candies with deformation; and "+++" for completely melted candies with complete deformation. The results of the tests were obtained as the average of the indications.

[0089] The obtained results are shown in Table 8.

[0090]
[Table 8]

Storing Condition		Invention [Examples]				Comparisons		
		1	2	3	4	1	2	3
40℃	1 day	-	-	-	-	-	-	-
	3 days	-	-	-	-	-	-	-
	6 days	-	-	-	-	-	-	-
	15 days	-	-	-	-	-/ ±	-	-
50℃	1 day	-	-	-	-	+	±	-
	3 days	-/ ±	-	-	-	++	± /+	-
	6 days	±	-/ ±	-	-	++	+	-
	14 days	+	-/ ±	-	-	++	+/++	±
60℃	8 hours	-	-	-	-	++	+	±
	1 day	-/ ±	-/ ±	-	-	+++	++	++
	2 days	+	+	-	± /+	+++	+++	++
	6 days	+/++	+/++	-	+	+++	+++	+++

[0091] All Examples showed excellent thermal stability, especially at a high temperature, compared to Comparisons.

[0092]
[Effects of the Invention]

[0093] By manufacturing candies using a composition for candies of the present invention, candies having the following advantages are obtained:

they can be easily removed from a frame;

they have sufficient crunchiness; and

they have excellent stability such as shape retention at high temperatures between 40 to 60℃ and high humidity.